

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 66

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte YUKIHISA TAKEUCHI, KOJI KIMURA and MASATO KOMAZAWA

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Appeal No. 1997-3667  
Application 08/384,469

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Before KRASS, RUGGIERO and FRAHM, Administrative Patent Judges.

FRAHM, Administrative Patent Judge.

ON REQUEST FOR REHEARING

In a Paper filed March 16, 2000, appellants request that we reconsider our decision of February 16, 2000, wherein we affirmed the examiner's decision rejecting claims 1 to 3, 6 to 8, 11, 12, and 16 to 19. Specifically, appellants contest the decision as to the obviousness of the claimed invention, a piezoelectric (P/E) actuator having a pre-sintered substrate which is laminated without the use of adhesive, under 35 U.S.C. § 103 over the GB' 647 reference and the JP '399 reference.

Representative claim 1 is again reproduced below (with emphasis added):

1. A piezoelectric/electrostrictive actuator consisting essentially of a pre-sintered ceramic substrate, said substrate consisting of a ceramic sheet which consists essentially of a non-piezoelectric/electrostrictive material having a major component which consists of at least one material from the group consisting of aluminum oxide, magnesium oxide, zirconium oxide, aluminum nitride and silicon nitride, said ceramic sheet containing not greater than 3 wt.% of  $\text{SiO}$  or  $\text{SiO}_2$ ; and

at least one piezoelectric/electrostrictive actuator unit formed on at least a portion of at least one surface of the substrate without a bonding adhesive, each of said at least one piezoelectric/electrostrictive actuator unit consisting of:

a first electrode film consisting essentially of electrically conductive electrode material formed on said at least a portion of at least one surface of the substrate;

a piezoelectric/electrostrictive film consisting essentially of a piezoelectric/electrostrictive material formed on said first electrode film; and

a second electrode film consisting essentially of electrically conductive electrode material formed on said piezoelectric/electrostrictive film, wherein said piezoelectric/electrostrictive film is formed by a thick-film forming process, said films are laminated together without a bonding adhesive, and said films are heat-treated on said pre-sintered ceramic substrate to integrate said at least one piezoelectric/electrostrictive actuator unit with said pre-sintered ceramic substrate, said pre-sintered ceramic substrate having been sintered prior to formation of said films thereon.

As a consequence of our close review of our original opinion, we are still in general agreement with the examiner (Answer, pages 3 to 4) that the combination of at least GB' 647 and JP '399 would have fairly suggested the invention of claims 1 to 3, 6 to 8, 11, 12 and 16 to 19 on appeal. This finding is supported by the detailed discussion set forth in our original opinion at pages 5 to 8 therein.

We note that appellants' request for reconsideration is based solely on the assertion that the Takeuchi declaration of April 8, 1994, "shows patentability of the claimed subject matter" (Request for Reconsideration, page 2). That is, appellants do not traverse our finding in the original opinion that GB

‘647 taught or would have suggested a P/E actuator having a pre-sintered substrate. Nor do appellants traverse our finding in the original opinion that JP ‘399 taught or would have suggested elimination of bonding adhesive in a P/E actuator. Lastly, appellants do not dispute that one of ordinary skill in the art would have found motivation for combining the teachings and suggestions of GB ‘647 with those of JP ‘399. Simply put, appellants do not dispute that a *prima facie* case of obviousness has been made, appellants merely seek to overcome the *prima facie* case with evidence of secondary considerations in the way of unexpected results supposedly demonstrated by the April 8, 1994, declaration of Mr. Takeuchi.

As indicated at page 5 of our original opinion, we previously considered this evidence of secondary considerations (e.g., unexpected results) in making our determination of the obviousness of the claimed invention on appeal. Although not explicitly clear from our original opinion, we found the April 8 declaration to be insufficient to overcome the examiner’s *prima facie* case of obviousness. For the reasons which follow, we support our original holding.

At the outset, we note that in overcoming a showing of obviousness under 35 U.S.C. § 103, the Federal Circuit requires a nexus between the merits of the claimed invention and the objective evidence offered. Cable Elec. Prods., Inc. v. Genmark, Inc., 770 F.2d 1015, 1026, 226 USPQ 881, 887 (Fed. Cir. 1985); Vandenberg v. Dairy Equip. Co., 740 F.2d 1560, 1567, 224 USPQ 195, 199 (Fed. Cir. 1984). "Secondary considerations are worthy of substantial weight only when there is a nexus established between the merits of the claimed invention and the evidence proffered on secondary

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considerations." Imperial Chemical Industries PLC v. Danbury Pharmacal Inc., 18 USPQ2d 1497, 1508 (D. Del. 1990), citing, Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 851 F.2d 1387, 1392, 7 USPQ2d 1222 (Fed. Cir. 1988). The probative value of the objective evidence necessarily depends on the nexus between the evidence and the claimed invention. Stratoflex, Inc. v. Aeroquip Corp., 713 F.2d 1530, 1539, 218 USPQ 871, 879 (Fed. Cir. 1983). "To the extent the patentee demonstrates the required nexus, his objective evidence of nonobviousness will be accorded more or less weight." In re GPAC Inc., 57 F.3d 1573, 1580, 35 USPQ2d 1116, 1122 (Fed. Cir. 1995).

Unexpected results are one type of secondary consideration able to provide objective evidence of nonobviousness. Specialty Composites v. Cabot Corp., 845 F.2d 981, 991, 6 USPQ.2d 1601, 1608 (Fed. Cir. 1988); Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 730 F.2d 1452, 1461, 221 USPQ 481, 488 (Fed. Cir. 1984). However, appellants must show that the results are superior to and unexpected compared with the closest prior art. In re De Blauwe, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984); In re Baxter Travenol Labs., 952 F.2d 388, 391-92, 21 USPQ2d 1281, 1285 (Fed. Cir. 1991).

In the instant case, we find that the April 8 declaration of Mr. Takeuchi fails these tests, as the declaration of April 8 is insufficient to overcome the obviousness of the claimed invention. First, we do not find an adequate nexus between the merits of the claimed invention (pre-sintering of the substrate and lamination without adhesive) and the evidence proffered on secondary considerations (the test results as to Examples I through V discussed in the declaration). Second, we find that appellants have

not satisfactorily shown that the results of Example I (corresponding to the claimed invention) are superior or unexpected when compared with the closest prior art (GB '647 and JP '399). As a matter of fact, the declaration, dated in 1994, fails to address the JP '399 reference at all. Accordingly, since there are no superior or unexpected test results shown, we cannot find the declaration sufficient to overcome the examiner's showing of obviousness with respect to the claimed invention over the combined teachings of GB '647 and JP '399.

Appellants argue (Request for Reconsideration, page 2) that the evidence of secondary considerations set forth in the April 8, 1994, declaration of Mr. Takeuchi, such as "good piezoelectric ceramic material properties including good displacement and very little warpage and dimensional error" (Request for Reconsideration, pages 2 to 3), should be taken into consideration in determining the patentability of the claimed subject matter. As we stated at page 5 of our original opinion, we have considered the April 8 declaration and appellants' arguments in the briefs, as well as the teachings of GB '647 and JP '399, and we find appellants' declaration and arguments insufficient to overcome the examiner's *prima facie* case of obviousness. Although we do find it significant that Example I (appellants' invention: pre-sintered and without adhesive) resulted in a displacement of 20 micrometers when compared to 0-4 micrometers of Examples II through IV (made according to principles of GB '647: pre-sintered and with adhesive), this only shows that elimination of bonding adhesives is an important factor in increasing displacement. Thus, even though we may agree with appellants that the declaration proves that eliminating bonding adhesives is quite important (Brief, page 5) and that the use

of bonding adhesives such as glass frit will cause a loss of displacement (April 8 declaration, page 7), this does nothing to rebut the fact that JP '399 teaches these very characteristics. As we discussed at length in our original opinion (pages 5 to 8), we find that JP '399 teaches the feature

of eliminating bonding adhesive. Accordingly, appellants' declaration of April 8 is not found to prove that the claimed subject matter produces superior or unexpected results when compared with the closest prior art, JP '399.

Likewise, although we do find it significant that Example I (appellants' invention: pre-sintered and without adhesive) resulted in a warpage of less than 0.1 millimeters when compared to 1.1 millimeters of Example V (co-sintered), this only shows that pre-sintering is an important factor in decreasing warpage. We do not find the difference in displacement between Example I (20 micrometers) and Example V (12 micrometers) to be significant, or to demonstrate superior or unexpected results over the prior art. Thus, even though we may agree with appellants that the declaration proves that pre-sintering the substrate minimizes undesirable warpage and slightly increases displacement (Brief, page 6), this does nothing to rebut the fact that GB '647 teaches pre-sintering. As stated in our original opinion (page 8), "we are in agreement with the examiner's uncontradicted opinion (Answer, page 4) that GB '647 teaches pre-sintering of the substrate (see GB '647, page 4, lines 49 to 61)" (original opinion, page 8). Accordingly, appellants' declaration of April 8 is not found to prove that the claimed subject matter produces superior or unexpected results when compared with the

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closest prior art, GB '647 and JP '399.

In view of the foregoing, appellants' request for reconsideration is granted to the extent that we have in fact reviewed our findings, but is denied as to making any change therein.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

DENIED

ERROL A. KRASS  
Administrative Patent Judge

JOSEPH F. RUGGIERO  
Administrative Patent Judge

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ERIC FRAHM )  
Administrative Patent Judge )

EF:pgg  
Parkhurst Wendel & Rossi  
1421 Prince Street  
Suite 210  
Alexandria, Va 22314